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contingent in the West, the author thinks, was too inconsiderable to command notice. As to prominent characters involved in the affair, he expresses the view that Jackson was throughout absolutely loyal, but General Wilkinson he characterizes as a shameless villain and an imposter without a parallel in our history. His analysis of the trial at Richmond is lucid and critical. The acquittal of Burr, he says, followed as a matter of course, no other result being possible in view of our law of treason. Accompanying the book are two maps prepared by Burr, showing the lower region of the Mississippi and a survey of the gulf coast from New Orleans to Campeche.

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Heredity and Social Progress. By SIMON N. PATTEN. New York, The Macmillan Company, 1903. — 214 pp.

To a biologist, the first reading of a book like the volume under review gives the impression that a new humorist of a somewhat novel type has arisen. A second reading arouses intense indignation, but reflection finally shows that an earnest and well-meant but unsuccessful attempt has been made to apply the terms and principles of a branch of science with which the author is unfamiliar, to the elucidation of phenomena in another branch with which he is equally unfamiliar. To a biologist, the result, in the present case, is confusion followed by amusement, and to a psychologist the result may well be similar.

At the outset the author directs attention, in an interesting and novel statement of the case, to the "social surplus" and its relation to heredity, and propounds the question: "How is the social surplus transformed into permanent conditions and mental traits?" The question is answered in the first three chapters in an equally interesting and novel way. The principle of inheritance of acquired characters is applied as follows (pp. 23 and 32):

When, for example, a bricklayer has improved his condition by the acquired characters of his occupation, and has, as a consequence, bettered the position of his children, they tend to become clerks and mechanics. . . . It is well known that the children of any class move into the class above them when the economic welfare of parents is so improved that children have more food, shelter, and leisure.

The order of the change from acquired to natural characters is: first, the production of surplus energy through acquired characters; second, the expression of this energy in the secondary characters; third, the discovery of some use for these secondary characters in which all the species

can share, and then the movement of the species into the environment where these secondary characters are necessary and hence primary. [P. 32.]

In other words, the surplus created by an individual gives opportunity for educating children to a larger sphere of usefulness, which they make good by migration to appropriate environments. Character arises from the increased energies, and with this a demand for greater opportunity. Struggle then ensues with those already adjusted in the new environment, from which results the elimination of the unfit. Elimination, therefore, tends to keep the race to its greatest efficiency. Emotion, the author believes, here plays a large part in changing the characters of the survivors, and this because

emotions have no structure or mechanism of their own by which they are expressed. They use structure created for other ends. Emotions are thus primarily destructive, create waste products, and force organisms back to a more primitive state with fewer structural adjustments to the environment. [P. 48.]

With his chapter on Emotion, the author leaves his wonted territory and plunges into an unknown wilderness of biology. Here he finds a principle which he believes helps him to explain how emotions reduce the organism to a simple state. This principle is the reduction of chromatin in the nucleus during the maturation of the germ cells, a process which, as is well known, results in the halving of certain characteristic structures of the cell. After making numerous statements which are not true concerning reduction, as for example, "A polar body would then be the centrosome [*sic*] of an earlier division retained by the tension of the envelope" (p. 50), or "Reduction always precedes regeneration. . . . If the changes in the cells which create the new part could be observed, reductions would be found similar to those that take place when polar bodies are expelled" (p. 52), *etc.*, he finally concludes that emotions are also due to reductions of like nature. "The first effect of an emotion, then, would be a reduction ending in the expulsion of polar bodies [*sic*] and the reduction of the cells to a simple condition." We wonder why reduction in male sex-cells was not also introduced; possibly because here there is no elimination of any part, all material becoming functional in germinal products; reduction, however, is precisely the same as in egg cells.

It is a simple matter for the author to pass from this conclusion to

another, equally impossible and delightfully illogical, that the brain and nerve centres are composed of germ cells. "The responsiveness of this cell (*i.e.*, germ cell) is greater than that of any of the somatic cells derived from it" (probably because of its great generalization, although the statement is not strictly true). "It must therefore be thought of as the seat or necessary accompaniment of consciousness" (p. 76). Equally logical is it to say that the germ cells are the seat of digestion, of respiration, or of motion, *etc.*

At this point another biological bogey appears. The centrosomes of a dividing cell — two centres of kinetic activity, through whose agency, in part, the cell divides — are used to explain the constancy of consciousness, which, he believes, is due to katabolic processes of the cell. Katabolism, however, alternates with anabolism, he argues, and therefore consciousness would be intermittent were there no remedy. This is provided by the two centrosomes.

Two active centres tend to disrupt the cell, and for this evil the only remedy is the strengthening of the cell wall to resist the disrupting tendencies. The presence of two active centres while the cell divides tends to confirm the foregoing analysis of consciousness. [P. 76.]

Another conclusion which follows in the chapter on Sensation is that the brain is an ovary. The egg, growing rapidly, forms a fold, and, since the ovary is formed first as a fold, the fold which develops into the brain must also be an ovary, from which it follows that, the nerves "being sex-products, they strive to break through the envelope and free themselves. . . . Where growth is active, the envelope yields before the growing nerve, until an equilibrium is obtained, with the result that a new organ is formed" (p. 83). A tooth, for example, has such an origin: "The nerve, in its effort to emit its sex-products, presses against the skin and finally breaks through. The skin hardens over the injured part and a tooth results" (p. 83). Comment on statements like these is unnecessary.

Detailed consideration of the remainder of the work is hardly warranted. Statement after statement is made which is inaccurate biologically, or incorrectly applied, and the conclusions which follow on Devolution, Inner Organs of Expression (the "vehicle," by the way, of "acquired characters"), Education and Reform, based as they are upon false biological reasoning, and confused by the mixing of terms with principles, are weak and unconvincing.

GARY N. CALKINS.